

## Claims

What is claimed is:

5

1. A method comprising the steps of:

hydrolyzing a first surface of a first wafer;

10 aligning the first wafer and a second wafer such that the hydrolyzed first surface of the first wafer and a first surface of the second wafer are touching;

elevating the first wafer and the second wafer to a fusion bonding temperature;  
and

15

applying an electric field to the wafers to create an attractive force between the wafers.

20 2. The method of claim 1, wherein the step of applying includes the step of applying a voltage between at least one electrical contact on a second surface of the first wafer and at least one electrical contact on a second surface of the second wafer.

25

3. The method of claim 2, further comprising the step of, prior to the hydrolyzing step, growing an oxide layer on at least one of the first surface of the first wafer and the first surface of the second wafer.

30

4. The method of claim 3, wherein any oxide layer comprises discontinuous oxide that forms a framework of oxide, and the step of aligning comprises matching the framework of each oxide layer.



5. The method of claim 2, further comprising the step of, after the applying step reducing the temperature and the voltage.

5

6. The method of claim 2, further comprising the steps of, prior to the aligning step:

hydrolyzing a first surface and a second surface of a third wafer;

10

inserting the third wafer between the hydrolyzed first surface of the first wafer and the hydrolyzed first surface of the second wafer;

aligning the first wafer, the second wafer, and the third wafer such that the

15

hydrolyzed first surface of the first wafer and the hydrolyzed first surface of the third wafer are touching and the hydrolyzed first surface of the second wafer and the hydrolyzed second surface of the third wafer are touching.

20

7. The method of claim 4, further comprising the step of, prior to the hydrolyzing step, growing an oxide layer on at least one of the first surface of the third wafer and the second surface of the third wafer.

25

8. The method of claim 7, wherein any oxide layer comprises discontinuous oxide that forms a framework of oxide, and the step of aligning comprises matching the framework of each oxide layer.

30

9. The method of claim 6, wherein the first wafer and the second wafer are silicon-on-insulator wafers.

10. The method of claim 6, wherein the first wafer and the second wafer are glass wafers, and the third wafer is a silicon wafer.

5 11. The method of claim 2, further comprising the step of annealing the wafers.

12. A method comprising the steps of:

10 hydrolyzing a first surface of a first wafer, a first surface of a second wafer, and a first surface and a second surface of at least another wafer;

aligning the first wafer, the second wafer, and the at least another wafer such that the hydrolyzed first surface of the first wafer and the hydrolyzed first  
15 surface of the at least another wafer are touching and the hydrolyzed first surface of the second wafer and the hydrolyzed second surface of the at least another wafer are touching;

elevating the first wafer, the second wafer, and the at least another wafer to a  
20 fusion bonding temperature;

applying a first voltage to at least one electrical contact on a second surface of the first wafer and to at least one electrical contact on a second surface of the second wafer, while applying a second voltage to at least one electrical contact  
25 on the at least another wafer.

13. The method of claim 12, further comprising the steps of, prior to the aligning step:

5 growing an oxide layer on at least one of the first surface of the first wafer and the first surface of the at least another wafer;

growing an oxide layer on at least one of the first surface of the second wafer and the second surface of the at least another wafer.

10

14. The method of claim 13, wherein any oxide layer comprises discontinuous oxide that forms a framework of oxide, and the step of aligning comprises matching the framework of each oxide layer.

15

15. The method of claim 12, further comprising the steps of, after the applying step:

reducing the temperature and the voltage;

20

annealing the first wafer, the second wafer, and the at least another wafer.

16. The method of claim 12, wherein the first wafer and the third wafer are  
25 silicon-on-insulator wafers.

17. The method of claim 12, wherein the first wafer and the second wafer are glass wafers, and the third wafer is a silicon layer.

30

18. A method comprising the steps of:

hydrolyzing at least one surface on at least one of a plurality of wafers;

5 elevating the plurality of wafers to a fusion bonding temperature; and

applying a voltage between at least one electrical contact on at least one surface of a first wafer of the plurality of wafers and at least one electrical contact on at least one surface of a second wafer of the plurality of wafers.

10

19. An apparatus, comprising:

a first surface having a hydrolyzed first surface;

15

a second wafer aligned with such that the hydrolyzed first surface the first wafer and a first surface of the second wafer are touching;

20

a heater to elevate the first wafer and the second wafer to a fusion bonding temperature; and

an electric field device for applying an electric field to the wafers to create an attractive force between the wafers.

25

20. The apparatus of claim 19 wherein the electrical field device applies a voltage between at least one electrical contact on a second surface of the first wafer and at least one electrical contact on a second surface of the second wafer.

30

21. The apparatus of claim 20, further comprising:

an oxide layer grown on at least one of the hydrolyzed first surface of the first wafer and the first surface of the second wafer.

22. The apparatus of claim 21, wherein the oxide layer comprises a discontinuous oxide that forms a framework of oxide and matched the framework of each oxide layer.

5

23. The apparatus of claim 21 further comprising:

a third wafer having a hydrolyzed first surface and a second surface disposed between the hydrolyzed first surface of the first wafer, and

10

wherein the hydrolyzed first surface of the second wafer, and the first wafer, the second wafer and the third wafer are aligned such that the hydrolyzed first surface of the first wafer and the hydrolyzed surface of the third wafer are touching and the hydrolyzed first surface of the second wafer and the hydrolyzed

15

24. The apparatus of claim 23, further comprising:

20 an oxide layer grown on at least one of the first surface of the third wafer and the second surface of the third wafer.

25. The apparatus of claim 24, any oxide layer comprises a discontinuous oxide that forms a frame work matching the framework of each oxide layer.

25

26. The apparatus of claim 24, wherein the first wafer and the second wafer are silicon-on-insulator wafers.

30

27. The apparatus of claim 24, wherein the first wafer and the second wafer are glass wafers and the third wafer is a silicon wafer.

28. The apparatus of claim 24, wherein the wafers are annealed.

29. An apparatus produced by the method of claim 1.